

## **REMARKS**

### ***Claim Amendments***

Claim 1 has been amended to require the apparatus to include gas feeds to the first and second conduits, the gas feeds feeding gas to the mould. In the case of the first conduit, the gas fed the mould is a gas that is reactive with molten aluminum. Thus, the amended claim does not just specify the presence of conduits (each of which could be used for gas or lubricant according to choice) but specifies feeds of gas to particular conduits, one of the feeds providing a gas that is reactive with aluminum.

### ***Claim Rejections – 35 USC § 103***

The Examiner considered claims 1 to 4, 7, 9-10 and 13 as being unpatentable over WO 01/00352 in view of Yanagimoto et al.

The Examiner considered the previous response to be unpersuasive for the apparatus claims because the prior art of WO'352 provides conduits 10 and 11 wherein one of them can be appropriately or with exchanged order and used as a gas line in the claimed apparatus.

While it may be true that conduits 10 and 11 could be used for either gas or lubricant depending on the choice of the user because there is no apparent difference between the conduits that would make one suitable only for gas and the other suitable only for lubricant, there is nothing in WO'352 that would lead a person skilled in the art to reverse the order in which WO'352 teaches the supply of gas and lubricant to those conduits.

The Examiner's position could be better understood if the Examiner were making an anticipation rejection where the use to which elements may be put is not relevant if all the claimed elements are present in a single prior art document. However, it is believed that the Examiner's position is not correct for an obviousness rejection. For obviousness, the test is whether a person skilled in the art would be motivated to make the suggested combination of features from the two cited references and whether such person would make the choice to invert the order of gas and lubricant supply as suggested by the Examiner. Applicant believes that there would be no such motivation or reason for such choice.

As previously noted, in WO'352, bore 29 is provided through the ring 12 to drain excess gas to the atmosphere to avoid inclusion of the gas into the metal. This means than conduit 11 of Fig. 2a is used for gas. Conduit 10 must therefore be the one used for lubricant. If this is the case, conduit 11 already delivers gas to the shoulder at the inlet end of the casting mould. There would therefore be no reason to combine WO'352 with Yanagimoto et al. because there would already be a gas supply to the shoulder region. If the gas and

lubricant supplies were reversed, which WO'352 does not suggest, the lubricant would be supplied to the shoulder region and there would be no room to supply a gas to this region.

Therefore, not only is it unlikely that a person skilled in the art would combine WO'352 and Yanagimoto et al., it would not even be possible to make such a combination and produce apparatus according to claim 1 that requires two conduits for gas, one leading to the shoulder region.

Reconsideration of the rejection is therefore requested.

The Examiner went on to reject claims 5-6 over WO'352 in view of Yanagimoto et al. and further in view of Thoenton.

Since claims 5 and 6 depend indirectly from claim 1, it is believed that they should be considered patentable for the same reason as claim 1.

The Examiner rejected claim 8 and 33 over WO'352 in view of Yanagimoto et al. and further in view of Kudo et al and McGee et al.

Claim 8 is dependent on claim 1 and is therefore believed to be patentable for the same reasons as claim 1. Moreover, claim 8 requires sensors in a mould used for horizontal casting of aluminum, wherein detectors are provided to measure electrical resistance between the metal and the mould cavity wall. Kudo et al. and McGee et al. relate to totally different kinds of apparatus. Kudo et al. relates to a detection sensor for low molecular weight organic liquid such as gasoline. A person skilled in the art would see no connection whatsoever between Kudo et al. and the present invention. McGee relates to apparatus to detect particles in a fluid. Again, it is difficult to see how a person skilled in the art of aluminum casting would see any relevance whatsoever in this document.

Claim 33 is an independent claim, but it also relates to a mould for casting a molten metal. For the reasons given above, it is difficult to see how Kudo et al. and McGee et al. can be considered relevant to this claim.

Until the basis for the provision of such electrodes in a mould is disclosed, i.e. that the resistance can be used to vary gas input to control the closeness of the metal to the mould, there would be no apparent reason to provide electrodes in a mould of this kind.

The Examiner rejected claim 11 as unpatentable over WO'352 in view of Yanagimoto et al. and further in view of Ohno. Claim 11 depends from claim 1, and so is believed to be patentable over these references for the same reason as claim 1.

The Examiner rejected claim 12 as unpatentable over WO'352 in view of Yanagimoto et al. and further in view of Killilsen et al. Claim 12 depends indirectly from claim 1, and so is believed to be patentable over these references for the same reason as claim 1.

The Examiner rejected claim 14 as unpatentable over WO'352 in view of Yanagimoto et al. and further in view of Foye et al. Claim 14 depends indirectly from claim 1, and so is believed to be patentable over these references for the same reason as claim 1.

***Claim Rejections – 35 USC § 102/103***

The Examiner rejected claims 34 and 35 as anticipated by or, in the alternative, obvious over Flowers et al.

Flowers et al. discloses a process of continuous (twin roll) casting rather than direct chill casting as in the present invention. There is generally no relationship between roll casting continuous strip and casting ingot by direct chill casting, and the products are quite different in terms of microstructure.

The Examiner stated that Flowers et al. yields a fine grain structure with smaller than 1 micron dendritic arm spacing (col. 8, lines 65+). However, this part of Flowers et al. merely mentions a “fine grain structure with small dendritic arm spacing” (emphasis added) (col. 8, line 67).

It should be kept in mind that claim 34 relates to the production of a billet by direct chill casting, the billet having various defined physical properties. The product of Flowers et al. is not a billet (but rather cast plate or sheet) and is not the product of direct-chill casting. The product of Flowers et al. therefore bears no resemblance to the product of claims 34 and 35, even if the disclosed dendritic arm structure is the same. The present invention is concerned exclusively with direct chill casting techniques and the production of preferred products produced by such techniques. A person skilled in the art, upon reviewing Flowers et al, even if realizing that the production of billet having a dendritic arm spacing of less than 10 microns is desirable, would have no way of knowing from Flowers et al how to produce DC-cast billet with such a dendritic arm spacing because Flowers et al. relates exclusively to continuous (twin roll) casting.

It is therefore believed that the product of claims 34 and 35 is neither anticipated by, nor obvious from, the disclosure of Flowers et al.

For foregoing reasons, it is believed that this application is now in condition for allowance.  
Favorable action thereon is accordingly courteously requested.

Respectfully,

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I hereby certify that this paper is being deposited this date with the U.S. Postal Service as first class mail addressed to Commissioner for Patents, P. O. Box 1450, Alexandria, VA 22313-1450.

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